PRELIMINARY SURFICIAL GEOLOGY OF THE LINCOLN COUNTY PORTION OF THE SYLVAN GROVE QUADRANGLE, KANSAS

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KANSAS GEOLOGICAL SURVEY
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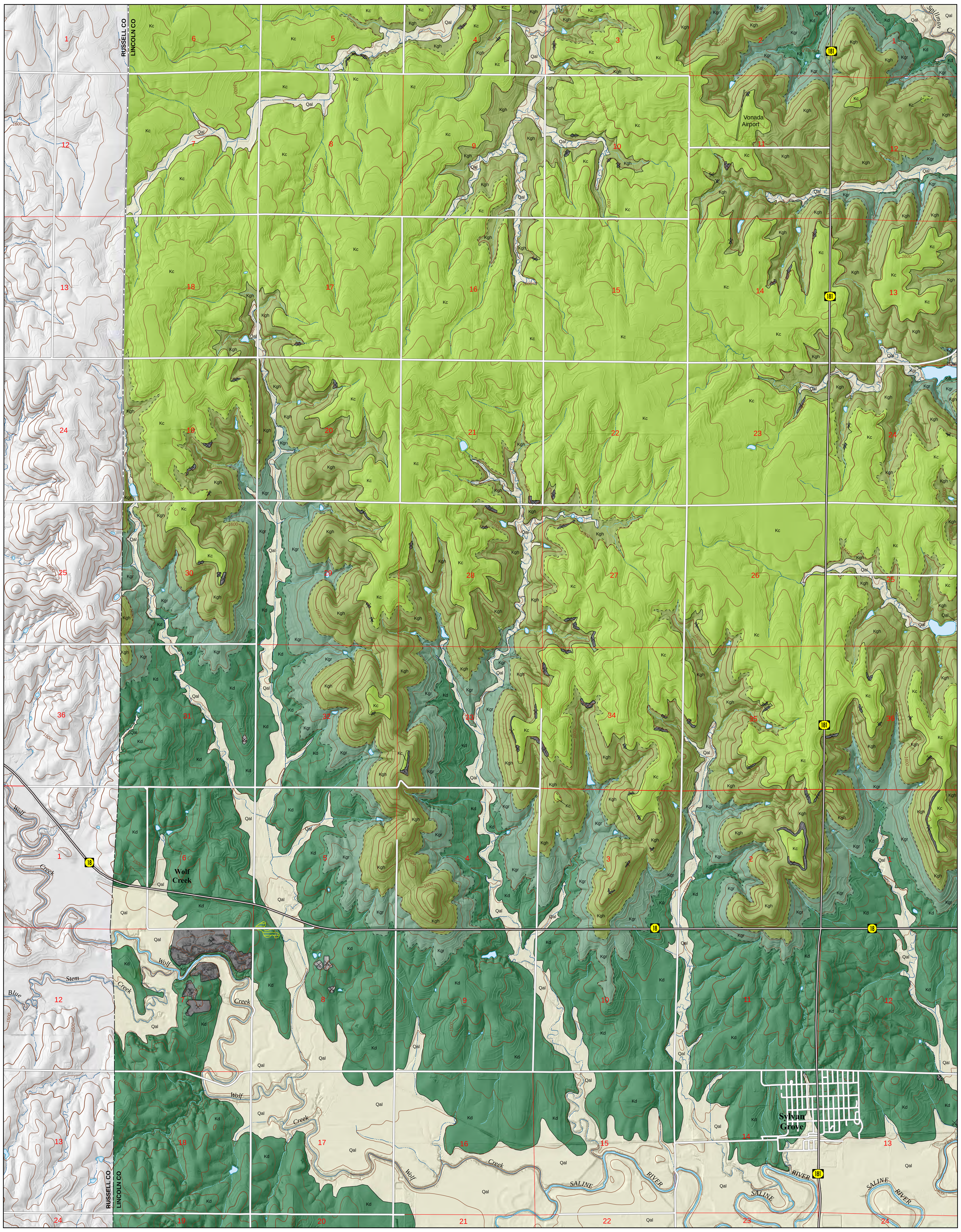


These descriptions are a compilation of several sources, including field notes and measured sections, Kansas Department of Transportation geological reports and profiles, and lithologic descriptions in Berry (1952), Bayne et al. (1971), and Arbogast and Johnson (1996).

GEOLOGIC UNITS

CENOZOIC

Quaternary System
Pleistocene-Holocene

Qal

Alluvium and terrace valley fill—Alluvium and terrace valley fill are found along the Saline River and its tributaries. Floodplain deposits contain mostly silt and clay with some sand. The thickness of the alluvium ranges up to 60 ft (18 m) in the Saline River valley and 20 ft (6 m) in other major tributaries in the county (Berry, 1952).

MESOZOIC

Cretaceous System – Upper Cretaceous Series

Kc

Carlile Shale—The Carlile Shale contains three members. In ascending order, they are the Fairport Chalk Member, the Blue Hill Shale Member, and the Codell Sandstone Member. Only the lower part of the Fairport Chalk Member is present in Lincoln County, where it is up to 20 ft (6 m) thick and very similar to the upper beds of the Greenhorn Limestone (Berry, 1952). It consists of alternating beds of thin, concretionary limestone and chalky mudrocks, as well as thin bentonite layers. The Carlile Shale caps the high hills in the northern and southwestern parts of the county.

Kgh

Greenhorn Limestone—The Greenhorn Limestone contains the following four members, in ascending order: the Lincoln Limestone Member, the Hartland Shale Member, the Jetmore Chalk Member, and the Pfeifer Shale Member. Each member is 15 to 20 ft (5 to 6 m) thick. The contacts between the members are gradational and not easily recognized in the field. In general, the Greenhorn is light gray to yellowish-gray chalky limestone, chalky mudrock, and chalk. Several limestone beds contain the fossil clam *Inoceramus* sp. that is characteristic of the formation. The lower part of the Greenhorn (Lincoln Member) is interbedded layers of chalky mudrock, chalky limestones, and dark gray crystalline limestone near the base that has a strong petroliferous odor when freshly broken. The middle part (Hartland and Jetmore Members) is chalky mudrock with interbedded layers of nodular limestone, chalky limestone, and bentonite. The upper part of the formation (Pfeifer Member) is interbedded thin chalky limestones and chalky mudrocks containing bentonite seams and is capped by the Fence-post limestone bed, a 0.7 ft (0.2 m) thick limestone that weathers light tan with a rust-colored line in the middle. The Fence-post bed has been quarried extensively in Lincoln County. The Greenhorn is 65 to 90 ft (20 to 27 m) thick in Lincoln County (Berry, 1952) and forms the prominent escarpments of the upland areas in the northern, southwest, and south-central parts of the county.

Kgr

Graneros Shale—The Graneros Shale is a gray to dark gray, noncalcareous, fissile shale that weathers to light gray and yellow-brown. Small flakes of the light gray fissile shale are characteristic of the weathered outcrop. Interbedded layers of fossiliferous (predominately *Inoceramus* sp. and *Ostrea* sp.) sandstone and limestone (up to 2 ft [0.6 m] thick) occur in the middle to lower part of the formation in Lincoln County, and thin (0.3 ft [0.1 m]) beds of limestone often occur near the top. A 1 ft (0.3 m) bentonite bed may be present near the top. Disseminated gypsum and selenite crystals also occur in the Graneros. In Lincoln County, the thickness of the Graneros Shale ranges from 20 to 45 ft (6 to 14 m). The Graneros Shale forms low hills above the Dakota Formation adjacent to the valleys and gentle slopes between the Dakota and the Greenhorn Limestone in the uplands. Landslides characterize the Graneros horizon.

Cretaceous System – Lower Cretaceous Series

Kd

Dakota Formation—The Dakota Formation is composed of two members: the lower Terra Cotta Clay Member and the upper Janssen Clay Member. The Dakota is composed of varicolored clay, claystone, and shale with irregular and sometimes massive lenses of siltstone and sandstone. The mudrocks are red-mottled pale-gray, tan to brown clay and silt. The interbedded sandstone lenses are fine to medium grained, very light gray to orange-tan to dark red-brown, and commonly poorly cemented. Concretions and thick layers of hard, gray, calcite-cemented sandstone (locally referred to as "Lincoln quartzite") are found in Lincoln County in small, isolated areas, but extensive deposits near Lincoln, Kansas are mined for aggregate. The Dakota often contains lignite and carbonaceous fragments, and small concretions and thin beds of limonite, siderite, and hematite occur as scattered fragments on eroded mudrock surfaces. The Dakota Formation ranges from about 140 ft (43 m) thick in eastern Lincoln County to about 200 ft (61 m) in the western part (Berry, 1952) and is an important source of water in Lincoln County and elsewhere in Kansas. In Lincoln County, the Dakota is exposed in much of central and southeastern parts of the county in areas adjacent to the Saline River and its tributaries.

REFERENCES

Arbogast, A. F., and Johnson, W. C., 1996, Surficial Geology and Stratigraphy of Russell County, Kansas: Kansas Geological Survey, Technical Series 7, 45 p.

Bayne, C. K., Franks, P. C., and Ives, W., Jr., 1971, Geology and ground-water resources of Ellsworth County, central Kansas: Kansas Geological Survey, Bulletin 201, 84 p.

Berry, D. W., 1952, Geology and ground-water resources of Lincoln County, Kansas: State Geological Survey of Kansas, Bulletin 95, 96 p.

EXPLANATION

Boundaries and Locations
- County line
- Township/range line
- Section line

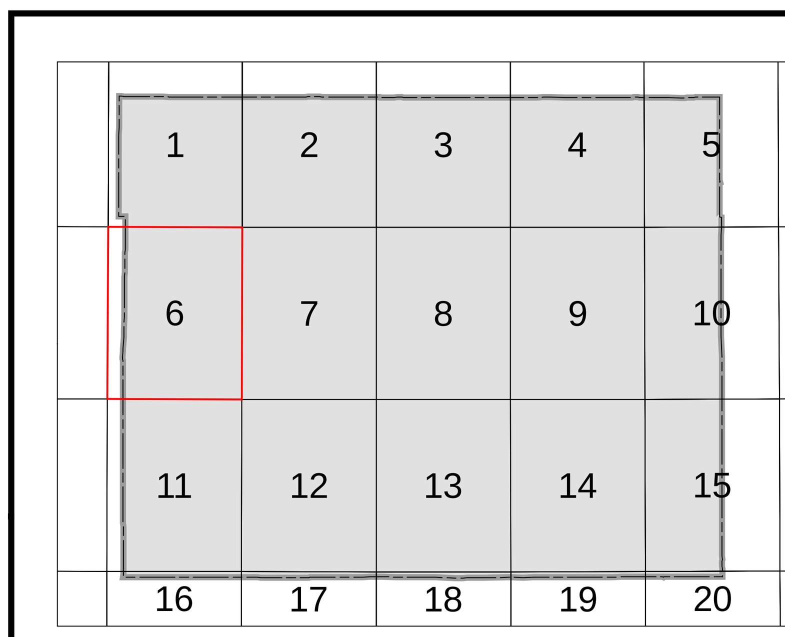
Transportation
- 18 State highway
- Local road
- Airport runway

Resource Development
- Open gravel pit
- Quarry

Geologic Unit Boundaries
- Observed contact
- Concealed contact

Hydrology and Topography
- Perennial stream
- Intermittent stream
- Water body
- Water body - manmade shoreline
- 1000 Elevation contour (100-foot interval)
- Elevation contour (20-foot interval)
- 1000 Depression contour (100-foot interval)
- Depression contour (20-foot interval)

Geologic Features
- Calcite-cemented concretion



LINCOLN COUNTY QUADRANGLES

1	Hunter	11	Wilson NW
2	Ash Grove	12	Wilson NE
3	Lincoln NW	13	Westfall NW
4	Barnard	14	Westfall
5	Ada	15	Juniata
6	Sylvan Grove	16	Wilson
7	Vesper	17	Black Wolf
8	Lincoln	18	Westfall SW
9	Shady Bend	19	Westfall SE
10	Tescott	20	Brookville SW

Elevation contours are presented for general reference. Used in the U.S. Geological Survey's current US Topo 1:24,000-scale topographic map series, they were generated from hydrographically-improved 1/3 arc-second National Elevation Dataset (NED) data, and smoothed during processing for use at 1:24,000 scale. In some places the contours may be more generalized than the base data used for compilation of geologic outcrop patterns. Outcrop patterns on the map will typically reflect topographic variation more accurately than the associated contour lines. Repeated fluctuation of an outcrop line across a contour line should be interpreted as an indication that the mapped rock unit is maintaining a relatively constant elevation along a generalized contour.

1-m LiDAR hillshades and 1-m 2010 and 2012 U.S. Department of Agriculture – Farm Services Agency (USDA-FSA) National Agriculture Imagery Program (NAIP) digital imagery were used as references in the digital mapping. USGS 7.5-min 1:24,000-scale topographic maps, USDA Natural Resources Conservation Service (NRCS) soil surveys, and other geologic maps and bulletins were used to supplement the mapping. Roads and highways are shown on the base map as represented by data from the Kansas Department of Transportation (KDOT), U.S. Census Bureau, and other sources. U.S. Department of Agriculture – Farm Services Agency (USDA-FSA) National Agriculture Imagery Program (NAIP) imagery also was used to check road locations.

Shaded relief is based on 1-meter hydroflattened bare-earth DEMs from the State of Kansas LiDAR Database. The DEM images, in ERDAS IMAGINE format, were mosaicked into a single output DEM, downsampled to 2-meter resolution, and reprojected to decimal degrees. The output DEM was then converted to a hillshade, a multidirectional shaded-relief image using angles of illumination from 0°, 225°, 270°, and 315° azimuths, each 45° above the horizon, with a 4x vertical exaggeration.

This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program, award number G15AC00225 (FY2015).

This map was produced using the ArcGIS system developed by Esri (Environmental Systems Research Institute, Inc.).

This map is a preliminary product and has had less scientific and cartographic review than the Kansas Geological Survey's M-series geologic maps. KGS does not guarantee this map to be free from errors or inaccuracies and disclaims any responsibility or liability for interpretations made from the map or decisions based thereon.

SUGGESTED REFERENCE TO THE MAP

Sawin, R. S., 2016, Preliminary surficial geology of the Lincoln County portion of the Sylvan Grove quadrangle, Kansas: Kansas Geological Survey, Open-File Report 2016-8, scale 1:24,000, unpublished.

SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2

1000 500 0 METERS 1000 2000

1 0.5 0 1

MILES

1000 500 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

FEET

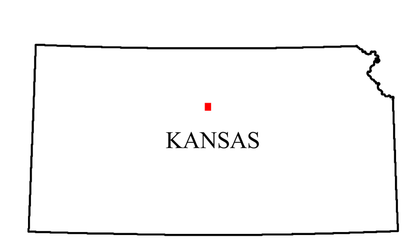
UNIVERSAL TRANSVERSE MERCATOR PROJECTION, ZONE 14
NORTH AMERICAN DATUM OF 1983

4° 29'

TRUE NORTH

MAGNETIC NORTH

APPROXIMATE MEAN DECLINATION, 2016



QUADRANGLE LOCATION